some observations respecting the different quantities of uric acid voided by birds living upon different kinds of food, not being produced by those that live entirely upon fish.

Researches on the oxymuriatic Acid, its Nature and Combinations; and on the Elements of the muriatic Acid. With some Experiments on Sulphur and Phosphorus, made in the Laboratory of the Royal Institution.* *By* H. Davy, *Esq. Sec. R.S. Prof. Chem. R.I. F.R.S.E.* Read July 12, 1810. [*Phil. Trans.* 1810, *p.* 231.]

The tendency of the author in the present investigation, is to return to the opinion respecting the relation of muriatic acid and oxymuriatic acids to each other, which was originally entertained by Scheele.

According to that most illustrious chemist, the oxymuriatic was the more simple body, and by union with phlogiston became muriatic acid. But from many experiments made soon after by Berthollet, it was inferred that the latter was simple, and by union with oxygen became converted into oxymuriatic acid. In Mr. Davy's former attempts to obtain the base of muriatic acid by potassium, he has not been able to separate anything from it but hydrogen. In Dr. Henry's endeavours by electricity to decompose the muriatic acid, hydrogen and oxymuriatic acid were evolved; and conversely, Mr. Davy has in no instance been able to separate oxygen from oxymuriatic acid, or even to separate muriatic acid from dry muriates, without the assistance of hydrogen or water. He has hence been led to doubt the existence of oxygen in the substance called oxymuriatic acid, and has applied the most powerful means of abstracting oxygen from it without success; and indeed Messrs. Gay-Lussac and Thenard, in their elaborate and interesting experiments, published in the Memoires d'Arcueil, although they maintain that muriatic acid gas consists of muriatic acid and water, are not able to separate water from it, but only hydrogen; and themselves acknowledge that oxymuriatic acid, which they suppose to consist of muriatic acid and oxygen, cannot be decomposed by any known means.

The most extraordinary fact noticed by Mr. Davy is, that when charcoal is ignited to whiteness by the voltaic battery in oxymuriatic acid gas, no change whatever is produced, provided that the charcoal has been previously freed from moisture or from hydrogen by intense heat.

The vivid combustion of many bodies in this gas has favoured the presumption that it contained oxygen very loosely combined and ready to exert its utmost power of affinity: but it is mere presumption; since heat and light result also from the intense agency of any other combination, without the presence of oxygen.

The resemblance of oxymuriatic acid combined with metals to other neutral salts, may be considered a strong argument in favour

* Communicated to the Royal Society at the request of the Managers of the Royal Institution.

of the presence of oxygen in that acid: but Mr. Davy observes, that an opposite doctrine may be equally maintained; since the metals may consist of bases united with hydrogen, which, by combining with oxymuriatic acid, converts it into muriatic acid. A corresponding doubt occurs also respecting the nature of hyperoxygenized muriatic acid. Does the oxymuriatic acid combine with oxygen as well as with hydrogen? and does it, with the former, produce hyperoxygenized muriatic acid? or is the hyperoxygenized acid the base of this class? and does this unite with different proportions of hydrogen? In order to answer these questions, Mr. Davy has endeavoured to obtain the neutralizing acid in hyperoxygenized muriate of potash, by distillation with dry boracic acid; but in this case, oxygen is the chief gaseous product, and there remains common muriate of potash, not decomposable by any dry process. Other attempts were also made to solve the same problem, by attending to the phenomena which occur in the decomposition of various compounds by the agency of voltaic electricity. The fact most favourable to the existence of hydrogen in oxymuriatic acid takes place during the electrization of oxymuriate of tin. Hydrogen, which in this case is extricated, must be produced either by the metal or by the oxymuriatic acid.

No substance, says Mr. Davy, has less claims to be considered an acid than oxymuriatic acid; and he considers it a body *sui generis*, that has a tendency to combine with pure inflammable matters, forming what are called the dry muriates. Of this class are the common metallic muriates, the muriates of potash, of soda, lime, strontites, and barytes. But there are other bases which in their state of oxide unite with muriatic acid gas, and retain the water which is formed in their composition. Such are, the muriates of ammonia, of magnesia, of zircon, alumina, and yttria.

Although the modern chemical nomenclature accords extremely ill with these views of the composition of the several forms of muriatic acid, and of muriatic salts, the author does not venture to propose any alterations in their names until their real nature shall be more fully known.

Among the various compounds of oxymuriatic acid with combustible substances, there is one which the author has examined with peculiar care, and with very singular results. He has on a former occasion examined the action of oxymuriatic acid upon phosphorus, and has described two compounds, the one fluid, the other solid; the first of which, according to the generally-received theory, should consist of muriatic acid and phosphorous acid; and the second of muriatic acid and phosphoric acid. If such were really the case, he imagined it would not be difficult to obtain the phosphoric acid as proof of the presence of oxygen; and he accordingly saturated the compound with pure ammoniacal gas, expecting to obtain muriate of ammonia, and phosphate of ammonia, which, by being heated, would leave the phosphoric acid in a pure state.

The triple compound formed was, on the contrary, a dry powder, not fusible by a red heat, nor yielding any gaseous matter when

heated, and not decomposable by mere heat. It had no taste, no smell; it did not seem to be soluble in boiling water, nor even in muriatic, nitric, or sulphuric acid; neither did strong lixivium of caustic potash appear to produce the least effect; and the only processes by which it appeared to be affected were combustion, or the action of fused potash. In the latter case it emitted a smell of ammonia; it appeared to dissolve in the potash, which then gave indication of the acids that had entered into the composition of this singularly intractable substance.

Amongst the known combustibles, it is observed that charcoal is the only one which does not combine directly with oxymuriatic acid gas; but Mr. Davy is of opinion that it does in some cases unite by the medium of hydrogen, as in the state of olefiant gas, and in the formation of muriatic ether. The author expresses a hope that new and more correct views of the composition of muriatic salts will facilitate their decomposition, and explain, in a satisfactory manner, various economical processes, long since practised, for obtaining the acid from common salt by means of aluminous or siliceous substances, the success of which has in general depended on the accidental presence of moisture. In this case the alkali forms a glass, and is rendered useless; but by the substitution of iron filings, and passing steam over the mixture when heated, Mr. Davy has succeeded in separating a portion of soda from common salt.

Observations upon Luminous Animals. By J. Macartney, *Esq. Communicated by* Everard Home, *Esq. F.R.S.* Read May 17, 1810. [*Phil. Trans.* 1810, *p.* 258.]

Although the property of emitting light, which is possessed by some animals, has appeared interesting to naturalists of all ages, and although many detached memoirs have been written upon the subject, the author observes that the history of these animals is still extremely imperfect; and he endeavours to supply the defect by enumerating all the different animals which, to his knowledge, possess that property, and to ascertain, by dissection or otherwise, the parts of their bodies from whence the light issues, and, by experiment, to discover the circumstances necessary or accessory to the emission of light.

The genera in which individuals certainly luminous are to be found are as many as twelve in number. There is one species of Pholas amongst the mollusca. Among insects are seven genera; Elater, Lampyris, Fulgora, Pausus, Scolopendra, Cancer, and Monoculus. Among the worms is one, Nereis. And in the class of zoophytes, the three genera of Medusa, Pyrosoma, and Pennatula.

The same property has also been ascribed to various kinds of fish; but, in the author's estimation, they have probably acquired that reputation by occasionally evolving light after death.

It has also been said, that the *Lumbricus terrestris*, or common earth-worm, has been found to be luminous for several days together;